Remarks

Applicants have carefully reviewed the application in light of the April 19, 2005 Office Action. To further prosecution, Applicants have amended claims 1, 14, 20, 27, 33, 39, and 45 to clarify the presently claimed concepts. Applicants have also added claims 46-51 to explicitly capture certain concepts. Applicants submit that all of the currently pending claims are in condition for allowance and respectfully request favorable action.

Allowable Subject Matter

The Examiner indicates that claim 45 is allowable. Detailed Action ¶ 8. Applicants thank the Examiner for this finding.

Applicants have, however, amended claim 45 to improve its clarity. Applicants submit that this amendment has not altered the claim's scope and, hence, that it is still in condition for allowance.

Section 103 Rejections

The Examiner rejects claims 1-2, 14, 20, 27, 33, and 39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,192,751 issued to Stein et al. ("the '751 patent") in view of U.S. Patent No. 4,730,650 issued to Ziegler et al. ("the '650 patent"). Detailed Action ¶ 3. The Examiner also rejects claims 1-2, 5-12, 14-18, 20-24, 26-31, 34-37, and 39-43 under § 103(a) as being unpatentable over the '751 patent in view of U.S. Patent No. 3,224,246 issued to Schloss et al. ("the '246 patent"). Id. ¶ 4. Additionally, the Examiner rejects claim 3 under § 103(a) as being unpatentable over the '751 patent in view of the '246 patent and U.S. Patent No. 6,053,041 issued to Sinha ("the '041 patent"). Id. ¶ 5. Furthermore, the Examiner rejects claim 4 under § 103(a) as being unpatentable over the '751 patent in view of the '246 patent and "Modern Ultrasonic Transducers" by Ultran ("the Ultran article"). Id. ¶ 6. Also, the Examiner rejects claims 13, 19, 25, 32, 38, and 44 under § 103(a) as being unpatentable over the '751 patent in view of the '246 patent and U.S. Patent No. 3,958,458 issued to Foreman et al. ("the '458 patent"). Id. ¶ 7. Applicants disagree.

To render a claim prima facie unpatentable under § 103 based on a combination of references, an Examiner must establish that the references or the knowledge generally available

to one skilled in the art teach or suggest combining the references, that there is a reasonable expectation of success in making the combination, and that the combined references teach or suggest all of the claim's limitations. M.P.E.P. § 2143. Furthermore, the combination cannot alter the principle of operation of a reference. Id.

Claim 1 is an independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 1, as amended, recites:

> A system for measuring fluid in a container, the system comprising:
> one or more transducers operable to:
> introduce a vibration to a container wall,
> detect an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction, and
> generate a signal representative of a detected vibration; and
> a computer operable to determine a state of a fluid in a container based on a signal representing an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction.

But nowhere, for example, does any of the '751 patent, the '650 patent, and the '246 patent teach or suggest "one or more transducers operable to ... detect an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction." In the '751 patent, the propagation paths are unidirectional either in a horizontal direction, FIG. 2, or in a vertical direction, FIG. 3. Furthermore, neither the '650 patent nor the '246 patent teaches or suggests anything regarding "one or more transducers operable to ... detect an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests this limitation.

Additionally, nowhere does any of the '751 patent, the '650 patent, and the '246 patent teach or suggest "a computer operable to determine a state of a fluid in a container based on a signal representing an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction." As just discussed above, the

'751 patent fails to even teach or suggest "one or more transducers operable to ... detect an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, it certainly has no capability to evaluate a signal representing such. Additionally, the '650 patent and the '246 patent do not even teach a transducer to detect "an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, neither of these patents has the capability to evaluate a signal representing such. Accordingly, none of the patents teaches or suggests this limitation.

Because each of the '751 patent, the '650 patent, and the '246 patent fails to teach or suggest the same limitations in claim 1, a combination of the patents surely fails to teach or suggest the limitations. Applicants submit, therefore, that claim 1 is in condition for allowance.

Claims 2-13 depend from claim 1 and, hence, contain all of its limitations. Claims 2-13, therefore, contain limitations that have already been shown to be allowable. Furthermore, claims 2-13 contain additional limitations not taught or suggested by the proffered references.

For example, claim 3, in cooperation with claim 2, specifies a first transducer operable to introduce a vibration to a container wall, "wherein the first transducer comprises an air transducer." At least implicitly, however, the Examiner does not find such a teaching in the '751 patent, the '650 patent, or the '246 patent and, instead, relies on the '041 patent. Detailed Action ¶ 5. But the '041 patent does not teach an air transducer operable to introduce a vibration to a container wall. The '041 patent teaches an air transducer that produces ultrasound in the air in a container. col. 1, l. 65 – col. 2, l. 6. Thus, the '041 patent fails to teach or suggest the limitations of claim 3.

As another example, claim 10 specifies that "the computer is further operable to control an introducing transducer." The Examiner tries to find such a teaching in the '751 patent. Detailed Action ¶ 4. However, the '751 patent teaches nothing about a computer controlling a transducer. Indeed, the portion of the '751 patent on which the Examiner relies is only a teaching regarding processing of received signals. col. 7, ll. 50-64. Thus, the '751 patent fails to teach or suggest the limitations of claim 10.

As a further example, claim 12 specifies that "the computer is further operable to determine a second fluid state." The Examiner tries to find such a teaching in 'the 751 patent. Detailed Action ¶ 4. However, the '751 patent teaches nothing about a computer determining two states of a fluid. The '751 only teaches determining one state of a fluid – its presence, or the opposite (i.e., its absence), along a propagation path. col. 2, l. 42 – col. 3, l. 13. Thus, the '751 patent fails to teach or suggest the limitations of claim 12.

For at least these reasons, and for the reasons given with respect to claim 1, claims 2-13 contain limitations not taught or suggested by the proffered references. Applicants submit, therefore, that claims 2-13 are allowable.

Claim 14 is another independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 14, as amended, recites:

> A method for measuring fluid in a container, the method comprising:
> introducing a vibration to a container wall;
> detecting the vibration in the container wall after the vibration has propagated at least partially around the container wall in more than one vertical propagation direction; and
> determining a state of a fluid in the container based on the detection of the vibration.

Nowhere, however, does any of the patents teach or suggest "detecting the vibration in the container wall after the vibration has propagated at least partially around the container wall in more than one vertical propagation direction." In fact, as discussed with respect to claim 1, the '751 patent teaches that propagation paths are unidirectional either in a horizontal direction or in a vertical direction, and neither the '650 patent nor the '246 patent teaches or suggests anything regarding "an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests this limitation of claim 14, and claim 14 is allowable over the patents.

Claims 15-19 depend from claim 14 and, hence, contain all of its limitations. But the limitations of claim 14 have already been shown to be allowable. Furthermore, claims 15-19

contain additional limitations that are not taught or suggested by the references. For example, claim 18 recites "controlling the introduction of the vibration." As explained with respect to claim 10, however, the '751 patent, which the Examiner relies upon for such a teaching, is deficient regarding teachings about controlling a vibration-introducing transducer. Thus, the '751 patent fails to teach or suggest the limitations of claim 18. For at least these reasons, and for the reasons given with respect to claim 14, claims 15-19 contain limitations not taught or suggested by the proffered references. Applicants submit, therefore, that claims 15-19 are allowable.

Claim 20 is an independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 20, as amended, recites:

> A system for measuring fluid in a container, the system comprising:
> means for introducing a vibration to a container wall;
> means for detecting an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction and for generating a signal representing a vibration at detection; and
> means for determining a state of a fluid in a container based on a signal representing an introduced vibration that has propagated at least partially around a container wall.

Nowhere, however, does any of the patents teach or suggest "means for detecting an introduced vibration that has propagated at least partially around a container wall in more than one vertical propagation direction and for generating a signal representing a vibration at detection." In fact, as discussed with respect to claim 1, the '751 patent teaches that propagation paths are unidirectional either in a horizontal direction or in a vertical direction, and neither the '650 patent nor the '246 patent teaches or suggests anything regarding "an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests this limitation of claim 20, and claim 20 is allowable over the patents.

Claims 21-26 depend from claim 20 and, hence, contain all of its limitations. But the limitations of claim 20 have already been shown to be allowable. Furthermore, claims 21-26

contain additional limitations that are not taught or suggested by the references. For example, claim 24 specifies that "the determining means also controls the introducing means." As explained with respect to claim 10, however, the '751 patent, which the Examiner relies upon for such a teaching, is deficient regarding teachings about controlling a vibration-introducing transducer. Thus, the '751 patent fails to teach or suggest the limitations of claim 24. For at least these reasons, and for the reasons given with respect to claim 20, claims 21-26 contain limitations not taught or suggested by the proffered references. Applicants submit, therefore, that claims 21-26 are allowable.

Claim 27 is another independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 27, as amended, recites:

> A method for measuring fluid in a container, the method comprising:
> receiving a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction; and
> determining a state of a fluid based on the signal.

Nowhere, however, does any of the patents teach or suggest "receiving a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction" or "determining a state of a fluid based on the signal." In fact, as discussed with respect to claim 1, the '751 patent teaches that propagation paths are unidirectional either in a horizontal direction or in a vertical direction, and neither the '650 patent nor the '246 patent teaches or suggests anything regarding a "vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests these limitations of claim 27, and claim 27 is allowable over the patents.

Claims 28-32 depend from claim 27 and, hence, contain all of its limitations. But the limitations of claim 27 have already been shown to be allowable. Furthermore, claims 28-32 contain additional limitations that are not taught or suggested by the references. For example,

claim 31 recites "controlling the introduction of the represented vibration." As explained with respect to claim 10, however, the '751 patent, which the Examiner relies upon for such a teaching, is deficient regarding teachings about controlling a vibration-introducing transducer. Thus, the '751 patent fails to teach or suggest the limitations of claim 31. For at least these reasons, and for the reasons given with respect to claim 27, claims 28-32 contain limitations not taught or suggested by the references. Applicants submit, therefore, that claims 28-32 are allowable.

Claim 33 is another independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 33, as amended, recites:

> A system for measuring fluid in a container, the system comprising:
> a computer operable to:
> determine whether a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction has been received, and
> determine a state of a fluid based on the signal.

Nowhere, however, does any of the patents teach or suggest a computer operable to "determine whether a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction has been received" and to "determine a state of a fluid based on the signal." In fact, as discussed with respect to claim 1, the '751 patent teaches that propagation paths are unidirectional either in a horizontal direction or in a vertical direction, and neither the '650 patent nor the '246 patent teaches or suggests anything regarding "an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests these limitations of claim 33, and claim 33 is allowable over the patents.

Claims 34-38 depend from claim 33 and, hence, contain all of its limitations. But the limitations of claim 33 have already been shown to be allowable. Furthermore, claims 34-38

contain additional limitations that are not taught or suggested by the references. For example, claim 37 specifies that "the computer is further operable to control the introduction of a vibration." As explained with respect to claim 10, however, the '751 patent, which the Examiner relies upon for such a teaching, is deficient regarding teachings about controlling a vibration-introducing transducer. Thus, the '751 patent fails to teach or suggest the limitations of claim 37. For at least these reasons, and for the reasons given with respect to claim 33, claims 34-38 contain limitations not taught or suggested by the references. Applicants submit, therefore, that claims 34-38 are allowable.

Claim 39 is another independent claim containing limitations not taught or suggested by the combination of the '751 patent with the '650 patent or the '751 patent with the '246 patent. Claim 39, as amended, recites:

> An article comprising a machine-readable medium storing instructions operable to cause one or more machines to perform operations comprising:
>
> determining whether a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction has been received; and
>
> determining a state of a fluid based on the signal.

Nowhere, however, does any of the patents teach or suggest "determining whether a signal representing a vibration detected after being introduced to and propagating at least partially around a container wall in more than one vertical propagation direction has been received" or "determining a state of a fluid based on the signal." In fact, as discussed with respect to claim 1, the '751 patent teaches that propagation paths are unidirectional either in a horizontal direction or in a vertical direction, and neither the '650 patent nor the '246 patent teaches or suggests anything regarding "an introduced vibration that has propagated at least partially around a container wall," much less one "that has propagated at least partially around a container wall in more than one vertical propagation direction." Thus, none of the patents teaches or suggests these limitations of claim 39, and claim 39 is allowable over the patents.

Claims 40-44 depend from claim 39 and, hence, contain all of its limitations. But the limitations of claim 39 have already been shown to be allowable. Furthermore, claims 40-44 contain additional limitations that are not taught or suggested by the references. For example,

claim 43 specifies that "the instructions are further operable to cause one or more machines to perform operations comprising controlling the introduction of a vibration." As explained with respect to claim 10, however, the '751 patent, which the Examiner relies upon for such a teaching, is deficient regarding teachings about controlling a vibration-introducing transducer. Thus, the '751 patent fails to teach or suggest the limitations of claim 43. For at least these reasons, and for the reasons given with respect to claim 39, claims 40-44 contain limitations not taught or suggested by the references. Applicants submit, therefore, that claims 40-44 are allowable.

Added Claims

Applicants have added claims 46-51. Claim 46 depends from claim 1, claim 47 depends from claim 14, claim 48 depends from claim 20, claim 49 depends from claim 27, claim 50 depends from claim 33, and claim 51 depends from claim 39. Because of these dependencies, claims 46-51 contain all of the limitations of their respective independent claims, which have already been shown to be allowable. Additionally, claims 46-51 relate to vibrations that have propagated at least a majority of the way around a circumference of a container wall in more than one vertical propagation direction. For at least these reasons, Applicants submit that claims 46-51 are allowable.

Conclusion

Applicants submit that a good faith effort has been made to advance the prosecution of this application and that the application is in condition for allowance. If, however, Applicants are mistaken regarding the latter, Applicants request that the Examiner contact their below-listed attorney if any matters may be rectified.

Enclosed is a check for $300.00 for excess claim fees. Applicants do not believe that any other adjustment in fees is required by this paper. If, however, Applicants are mistaken, please apply any other charges or credits to deposit account 06-1050, with reference to the above attorney docket number.

Respectfully submitted,

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